Abstractions

LAST AUTHOR

The make-up of many animals — be it internal or external — is asymmetrical. In vertebrates such as mice and chickens, two genes, *nodal* and *Pitx*, are known to control this left–right body asymmetry. It wasn't clear how far back in time these genes originated, although it was thought that *nodal* was restricted to deuterostomes, which include all vertebrates; sea urchins, starfish and their kin; and some worms. Nipam Patel (pictured) and his postdoctoral fellow Cristina Grande at the University of California, Berkeley, have found that a version of *nodal* also controls the directional spiral of snail shells. The duo's findings suggest that *nodal*'s forerunner might have been present in the common ancestor of all bilateral organisms — those with a two-sided body plan. This would make it much more ancient than was originally believed, possibly dating back as far as 650 million years. Patel, an evolutionary developmental biologist, tells *Nature* about exploring new territory with snails.

Why are some organisms asymmetrical?

They need to be to fit all of their organs into the body cavity. In addition, organs are not always symmetrical. The human heart, for example, is larger on one side because that side is pumping blood around the entire body. The liver turns in one direction and our guts coil in another.

How did you learn that *nodal* controls asymmetry in snails' shells?

In examining the genomes of the marine limpet *Lottia gigantea* and the freshwater snail *Biomphalaria glabrata*, the snails we worked with, Cristina found a gene similar to *nodal*. In *L. gigantea*, which coils counterclockwise, the gene is expressed on the right side. In *B. glabrata*, which coils clockwise, it's expressed on the left. The next question was whether the gene was linked to asymmetry in the snails, so we blocked the *nodal* pathway. Although most of the embryos died early on, a few got past that stage. They didn't live long, but they survived long enough to develop straight, unspiralled shells.

Are snails challenging research subjects?

We had to develop experimental procedures as we went along. We had to work largely from scratch because no one had worked on the molecular biology of snails before.

Where did your snails come from?

We got stocks of *B. glabrata* from the National Institutes of Health, but the *L. gigantea* came from the wild. Cristina had to apply for a state permit and travel down to southern California, where they live on rocks on the beach. ■

MAKING THE PAPER

Simon L. Lewis

Widespread monitoring of African forests gives clues to carbon storage.

Not all of the carbon dioxide emitted into Earth's atmosphere remains there. So where does it go? Some is taken up by the oceans, but the destination of a considerable amount remains uncertain, and has been labelled the 'missing carbon sink'. Tree-monitoring projects in ten African countries weren't set up to tackle this problem, but because their measurements were consistent Simon Lewis and his colleagues were able to pool the data and use them to address the question of where the missing carbon might be. Their estimates, along with those made in other tropical regions, indicate that intact tropical forests remove enough CO_2 from the atmosphere to account for about half of the missing sink.

Lewis, an ecologist at the University of Leeds, UK, and his team used data collected over various time frames during the past 40 years on 79 inventory plots in west, central and east Africa. Within each plot, local forest managers and scientists had tagged all of the trees that were at least 10 centimetres in diameter and had recorded those trees' diameter, location and species.

Over the course of a decade and a dozen field trips to Africa, Lewis and his co-workers hunted down records as well as the people who had surveyed the forest plots. "We had to be a bit like detectives to find some of the old plots," he says. "The collaborations were essential because local scientists and the villagers on the ground know the forests much better than I do."

In one case, Lewis was able to restore historical records to the locals. In Liberia, all of the forest-plot records had been destroyed during the civil war. Lewis found a Dutch scientist who had electronic copies, and passed these on to Liberia's Forestry Development Authority. The work benefited all collaborators, Lewis says: "They have all the data to answer local questions, and I can use them to answer big, overarching global-change questions."

Ultimately, Lewis went into the field to try to find most of the 79 forest plots and to positively identify individual trees. "The raw measurements came from more than 70,000 trees spread across 10 countries," says Lewis, who also made new measurements. "The difficulty is that it can take months of work to add just one data point by the time you find a plot, develop the collaboration, digitize the historical data, and then remeasure the trees."

And if that wasn't enough of a challenge, Lewis and his colleagues also had to try to identify each species of tree from the thousands of possibilities in tropical Africa. Tracking species is key to interpreting the possible causes of the growth rate that the team found. Growth in forests can be spurred by various factors — for example, by past disturbances, such as when wind blows down a tract of forest, opening up the canopy and favouring sun-loving species. If this had occurred in an area, Lewis would expect to find certain species in decline and others on the increase. Instead, his data show "an across-the-board increase in carbon storage for many different species". Lewis suspects that the rate of growth might be a response to the increased CO_2 in the atmosphere (see page 1003).

The study highlights the importance of collecting and archiving standardized data, says Lewis, because you never know what future question they might answer. "No one started this looking to monitor the effects of global environmental change. But that's what these data have ended up contributing to." ■

FROM THE BLOGOSPHERE

Graduate students take note: 'crowd-sourcing' is the new way to get grunt work done. In a project to evaluate the usefulness of online comments on scientific publications, the NPG web-publishing department turned to — who else — Internet surfers.

NPG web-software developer Euan Adie is heading up the project, which takes data borrowed with permission from *PLoS ONE*, one of the first journals to allow online commenting on its papers when it launched in December 2006. By categorizing the comments left by readers of all *PLoS ONE* papers published up until August 2008, the team hopes to gain an idea of how to make online commenting more effective (http://tinyurl.com/bu4xmh).

A monumental task for Adie alone, he asked for help: "If you can read and understand a scientific abstract then we need you to help make the publishing world more science 2.0 friendly. Thirty seconds, five minutes, half an hour — whatever you can spare." His experiment was a success — 1,411 comments were categorized by 818 users to generate 10,516 data points within 10 days. ■

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